

## REMARKS

Claims 1-22 are pending in this application.

Claims 1-22 are rejected.

Claims 1-14, 16 and 22 are rejected under 35 U.S.C 112.

Claims 1-2 and 2-22 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Pat No. 5,812,567 to Jeon et al ("Jeon").

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeon in view of U.S. Pat. No. 5,469,454 to Delfyett, Jr. ("Delfyett").

Claims 7, 8, 13, 14 and 19-22 are canceled.

Claims 1, 4, 10, 16, and 18 are amended.

No new matter is added.

Claims 1-6, 9-12, and 15-18 remain in the case.

Applicant requests reconsideration and allowance of the claims in light of the above amendments and following remarks.

## OBJECTION TO DRAWINGS

The drawings are objected to because they do not show each and every feature of the invention specified in the claim 7, 8, 13, 14, 19 and 22. These claims are hereby cancelled without prejudice. The drawing objections are now moot.

## Claim Rejections - 35 USC § 112

Claims 1-14, 16 and 22 are rejected under 35 U.S.C 112.

The rejections are respectfully traversed.

With respect to claim 1, the Examiner has argued that "it is not clear within the claim language as to how the structural arrangement provides the claimed limitation of "the laser output is short mode-locked pulse type."

However, the reason why the laser output from the components of claim 1 is short mode-locked pulse type is well described in the specification as follows:

"In another example of a wavelength-swept laser with a resonator including a non-linear medium therein, the spectrum of weak optical pulses generated in the resonator is broadened due to the self-phase modulation effect of the non-linear medium as described above. Unlike spontaneous emission, each frequency component in the broadened spectrum components has specific phase relations. If the intensity of the broadened components is

higher than that of spontaneous emission around the filter center frequency region, the laser spectrum, which will be grown in the region, will have specific relations for each frequency component. The mode-locking according to such specific relations between modes makes the laser capable of producing pulsed output." See page 9, line 29-page 10, line 3 of the present application.

Therefore, applicant respectfully submits that the claimed limitation "the laser output is short mode-locked pulse type" is a result that necessarily follows from the previously recited structure, i.e., a resonator having a non-linear medium, an optical pump means and a filter modulation signal generating means of the claim 1.

With respect to claim 4, it is amended to recite, "the optical pump means is an electrical current generator which generates a current whose intensity modulation frequency is equal to the intermode spacing of longitudinal resonator modes or some integral multiple of the spacing, which results the gain constant modulation of said semiconductor amplifier, whereby the wavelength-swept pulse laser generates mode-locked optical pulses and its pulse generation timing is appropriately adjusted."

Regarding claim 10, the non-linear medium of claim 10 means "a semiconductor saturable absorber". In view of this, claim 10 is amended to recite, "said non-linear medium is a semiconductor saturable absorber to enhance self-phase modulation effect, whereby said non-linear medium helps the generation of mode-locked optical pulses."

Regarding claim 16, it is amended to recite, "in the step of tuning the wavelength tunable filter, the wavelength tunable filter is tuned so that a variation speed V is substantially greater than a constant critical speed  $V_c (= \ln(r) \Delta^4 / b^2)$  for most of wavelength sweeping time, whereby a plurality of resonator modes can simultaneously oscillate, where V is the variation speed of the minimum loss center wavelength of the wavelength tunable filter, and the constant critical speed  $V_c$  is defined as  $\ln(r) \Delta^4 / b^2$ , and  $\Delta$  is the wavelength spacing between resonator modes, and b is the full width at half maximum, and  $\ln(r)$  is the natural logarithm of the ratio r of the maximum to the minimum light intensity for each mode."

Regarding claim 18, it is amended to recite, "superimposing an electrical pulse whose duration time is shorter than the resonator roundtrip time of light over the front portion of each repeating waveform of the electrical signal, thereby tuning pulse generation timing to the electrical pulse as well as helping the generation of optical pulses."

Thus, the rejections of claims 1, 4, 10, 16 and 18 under 35 U.S.C. 112 are overcome.

### **Claim Rejections - 35 USC § 102**

Claims 1, 2, 4-22 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Pat No. 5,812,567 to Jeon et al ("Jeon").

The rejections are respectfully traversed.

Jeon's invention is based on the nonlinear loop mirror (101) as the mode locking mechanism. The present invention does not use the nonlinear loop mirror as the mode locking mechanism as in Jeon. Furthermore, Jeon does not teach or disclose the "continuous" wavelength (sweep) operation of the filter (111) using "a filter modulation signal generating means," as recited in claim 1 of the instant application.

Consequently, Jeon, lacking above limitations of the present invention, does not anticipate the invention recited in independent claim 1.

Thus, claim 1, as amended, and claims, 2, 4-6, 9-12, depending on claim 1, are novel under 35 U.S.C. § 102(e).

For the similar reasons, Jeon does not teach or disclose the limitations of claim 15, for example, "tuning said wavelength tunable filter so that the minimum loss wavelength range of the tunable filter can continuously vary with time." Thus, claim 15 is allowable and claims 16-18, which depend therefrom and recite features that are neither taught nor disclosed in the cited references, are also allowable.

### **Claim Rejections - 35 USC § 103**

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeon in view of U.S. Pat. No. 5,469,454 to Delfyett, Jr. ("Delfyett").

The rejection is respectfully traversed.

For the reasons discussed above, the cited references, either alone or in combination, do not teach or suggest all of the limitations of claim 1, which claim 3 depends from. Accordingly, the rejection does not present a *prima facie* case of obviousness. Therefore, claim 3 is allowable.

### **CONCLUSION**

For the foregoing reasons, reconsideration and allowance of claims 1-6, 9-12, and 15-18 of the application as amended is solicited. The Examiner is encouraged to telephone the

undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.



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PATENT TRADEMARK OFFICE

Respectfully submitted,

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Limited Recognition Under  
37 CFR § 10.9(b)

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